

WHAT IS CLAIMED IS:

1. A solid state fuel cell, comprising:
 - a planar semiconductor anode structure of a given conductivity having a plurality of pores each of a given diameter directed from a first surface to a second surface, with said first surface coated with a metallic catalyst,
 - a planar semiconductor cathode structure of a given conductivity having a plurality of pores each of a predetermined diameter directed from a first surface to a second surface, with said first surface coated with a metallic catalyst,
 - an electrolyte planar semiconductor structure having a plurality of pores directed from a first surface to a second surface, with said metallized surface of said anode structure coupled to said first surface of said electrolyte structure with said metallized surface of said cathode structure coupled to said second surface of said electrolyte structure.
2. The fuel cell according to claim 1 wherein said anode and cathode are fabricated from silicon and each is surrounded by a non-porous peripheral structure of silicon.
3. The fuel cell according to claim 1 wherein said electrolyte structure is fabricated from silicon.

- 10000 8000 6000 4000 2000 0
-2000 -4000 -6000 -8000 -10000
- 4. The fuel cell wherein said pores of said anode and cathode have an enlarged opening portion at said first surface tapering to a smaller opening at said second surface.
 - 5. The fuel cell according to claim 4 wherein said pores of said electrolyte are smaller than the pores of either said anode or cathode.
 - 6. The fuel cell according to claim 4 wherein said electrolyte is fabricated from a low conductivity semiconductor as compared to the conductivity of said anode and cathode.
 - 7. The fuel cell according to claim 4 wherein said given conductivity of said anode and cathode is n+ conductivity.
 - 8. The fuel cell according to claim 4 wherein said metallic catalyst is platinum.
 - 9. The fuel cell according to claim 4 wherein said metallic catalyst is titanium-platinum.
 - 10. The fuel cell according to claim 4 wherein said metallized surface is to a depth of between 2000 to 4000 Angstroms.

11. The fuel cell according to claim 4 wherein said second surface of said anode and cathode each has an electrical contact found thereon.
12. The fuel cell according to claim 4 wherein said pores of said electrolyte are filled with an ionic conductor.
13. The fuel cell according to claim 4 wherein said ionic conductor is phosphoric acid.
14. The fuel cell according to claim 1 wherein said anode pores are of a different diameter than said cathode pores.
15. The fuel cell according to claim 4 wherein said anode pores are of approximately the same diameter as said cathode pores.
16. The fuel cell according to claim 4 wherein said second surface of said anode is adapted to receive hydrogen gas.
17. The fuel cell according to claim 4 wherein said second surface of said cathode is adapted to receive oxygen.
18. The fuel cell according to claim 4 wherein said anode, cathode and electrolyte structures are fabricated from silicon.

19. The fuel cell according to claim 4 wherein said anode, cathode and electrolyte structures are fabricated from silicon carbide.
20. The fuel cell according to claim 16 wherein said fuel cell uses a hydrocarbon fuel such as methane, ethane, acetylene, butane and so on to provide hydrogen to said anode.

CONFIDENTIAL - GOVERNMENT EDITION